
फर्श में छतों के लिए खोखली मिट्टी की टाइलें
— विशिष्टि
भाग 1 फिलर प्रकार
(तीसरा पुनरीक्षण)

**Hollow Clay Tiles for Floors and
Roofs — Specification
Part 1 Filler Type
(Third Revision)**

ICS 91.060.30;91.100.25

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FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Clay and Stabilized Soil Products for Construction Sectional Committee had been approved by the Civil Engineering Division Council.

Burnt clay floor/roofing tiles have been used both as filler material and structural units. Investigations carried in the past have established that a large variety of clays occurring in the country can be successfully utilized in the manufacture of such tiles. These tiles act as light weight material for floor and roof construction because of their hollowness and impart sound and thermal insulation to the building. Adequate caution may be observed as the porous nature of the ceramic body may induce corrosion process, if steel is not adequately protected by dense concrete or cement mortar. The grooves wherein the steel is required to be laid should be sufficiently big to ensure desired protection to the steel when the grooves are filled with concrete or mortar.

This standard was first published in 1967 and was subsequently revised in 1975 in two parts and again 2009. The other part being:

Part 2 Structural type

In the formulation of this revision due weightage has been given to international co-ordination among the standard and practices prevailing in different countries in addition to relating it to the practices in the field in this country.

The major modifications in this revision of the standard are:

- a) The provision to incorporate agro residues/industrial byproducts in the raw material for tiles has been added.
- b) The permissible number of defectives for visual and dimensional characteristics have been defined.
- c) The procedure for assessing the breaking strength of the tiles has been modified.
- d) The required accuracy for reporting the bulk density and water absorption has been modified.
- e) The condition for assuming constant weight of the sample during testing has been added.
- f) The requirement of water absorption of the tiles has been modified.

The composition of the Committee responsible for formulation of this standard is listed in Annex C.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard***HOLLOW CLAY TILES FOR FLOORS AND ROOFS —
SPECIFICATION****PART 1 FILLER TYPE***(Third Revision)***1 SCOPE**

This standard (Part 1) covers the dimensions, quality and strength requirements of hollow clay filler tiles having perforations parallel to their length and intended for use in floors and roofs.

2 REFERENCE

The standards listed below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below:

<i>IS No.</i>	<i>Title</i>
2248 : 1992	Glossary of terms relating to clay products for buildings (<i>second revision</i>)
5454 : 1978	Methods for sampling of clay building bricks (<i>first revision</i>)

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 2248 shall apply.

4 GENERAL REQUIREMENTS

4.1 The tiles shall be made from suitable clay and or admixtures of clay with pond ash/fly ash, stone

dust, etc in optimum proportions. The tiles shall be free from cracks, flaws or inclusions of any deleterious materials like lime nodules, soluble salts, etc.

NOTE — The clay may be blended with industrial by-products and/or agro-residues while ensuring that the final product confirms to the requirements of this standard.

4.2 The tiles shall have at least one plane of symmetry in cross-section. When broken, the fractured face shall show a fine, compact and uniform texture.

4.2.1 The tiles shall have serrations on all faces designed to be concreted, mortared or plastered. The serrations shall not be deeper than 3 mm and wider than 5 mm.

4.3 The tiles shall be free from extensive winding or bowing and external angles shall be right angles. The tiles shall be tested for trueness of shape as specified in **4.3.1** to **4.3.3**.

4.3.1 *Winding or Bowing in the Longitudinal and Transverse Directions*

The tile shall be placed between two parallel straight-edges running along the direction of length or width and the distance between either straight-edge and the adjacent face of the tile at any point shall not be more than 3 mm per 300 mm length or width (*see Fig. 1*).

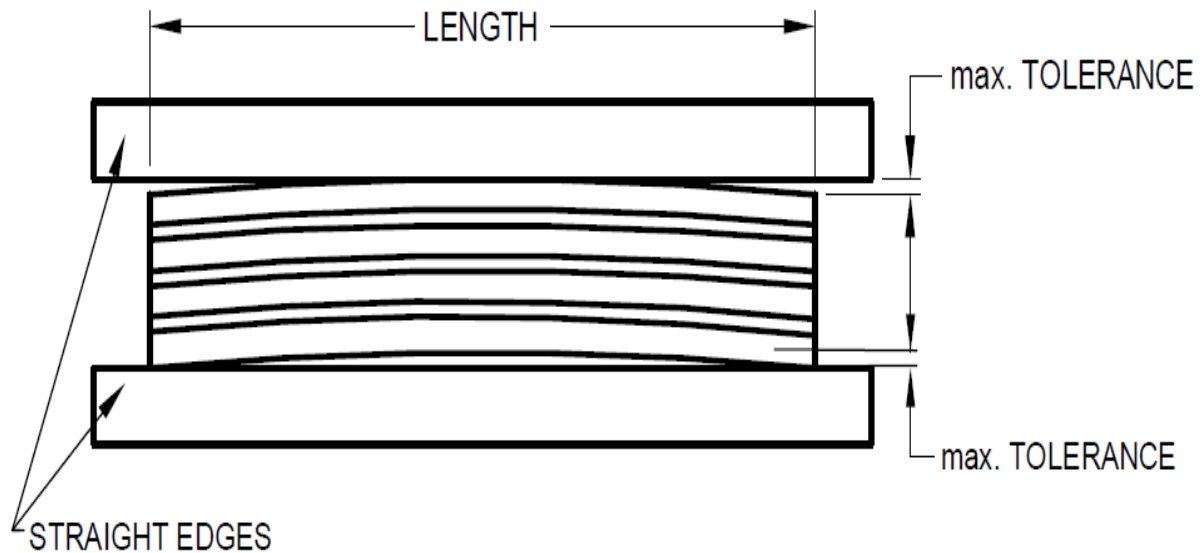


FIG.1 TEST FOR WINDING OR BOWING

4.3.2 Concavity or Convexity in the External Faces of the Tiles

The tile shall be placed between two parallel straight-edges running diagonally across the face of the tile and the distance between either straight-edge and the adjacent face of the tile at any point shall not be more than 3 mm/300 mm run at any point on either diagonal (*see* Fig. 2).

4.3.3 Angles Between Sides and Joining Edges

In case of right angled sides and edges, any variation from the right angle in the angle contained by any side and a joining edge shall be measured by placing a builder's square against the side and the maximum distance between the inner edge of the square and the side shall be not more than 3 mm per 300 mm run (*see* Fig. 3).

5 DIMENSIONS AND TOLERANCES

5.1 Dimensions

The standard sizes of tiles when measured according to 5.1.1 shall be as follows. The typical shapes are given in Fig. 4.

5.1.1 The length of central line of the four longest faces shall be measured nearest to the millimeter and the length of the tile, expressed in millimeter shall be the average of these four measurements. The width and thickness of the tile shall also be similarly measured. The permissible deviation in length and width shall be ± 5 percent while the height can deviate from the specified value by ± 3 percent.

5.2 Thickness of Shell and Web — The thickness of any shell shall be not less than 10 mm and that of web not less than 7 mm.

<i>Sl No.</i>	<i>Length, mm</i>	<i>Width, mm</i>	<i>Height, mm</i>
(1)	(2)	(3)	(4)
i)	340	350, 300, 250 or 200	80, 90, 100 or 110
ii)	390		
iii)	440		
iv)	490		
v)	540		
vi)	590		
vii)	640		
viii)	690		
ix)	740		

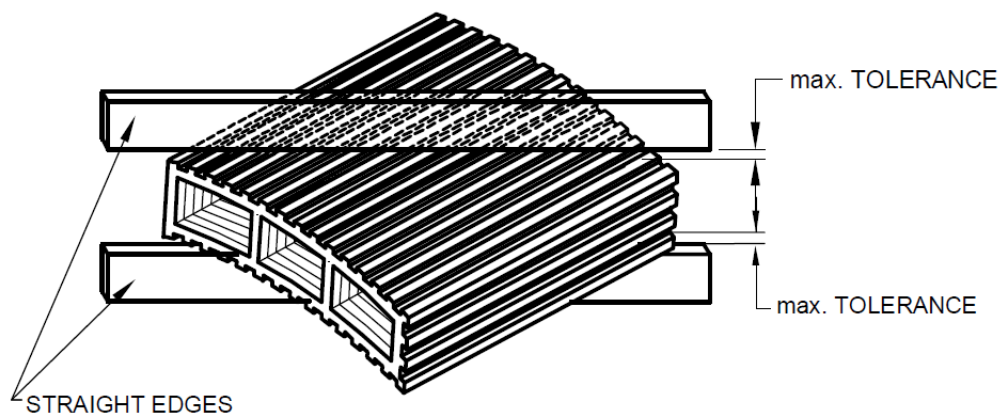


FIG. 2 TEST FOR CONCAVITY OR CONVEXITY

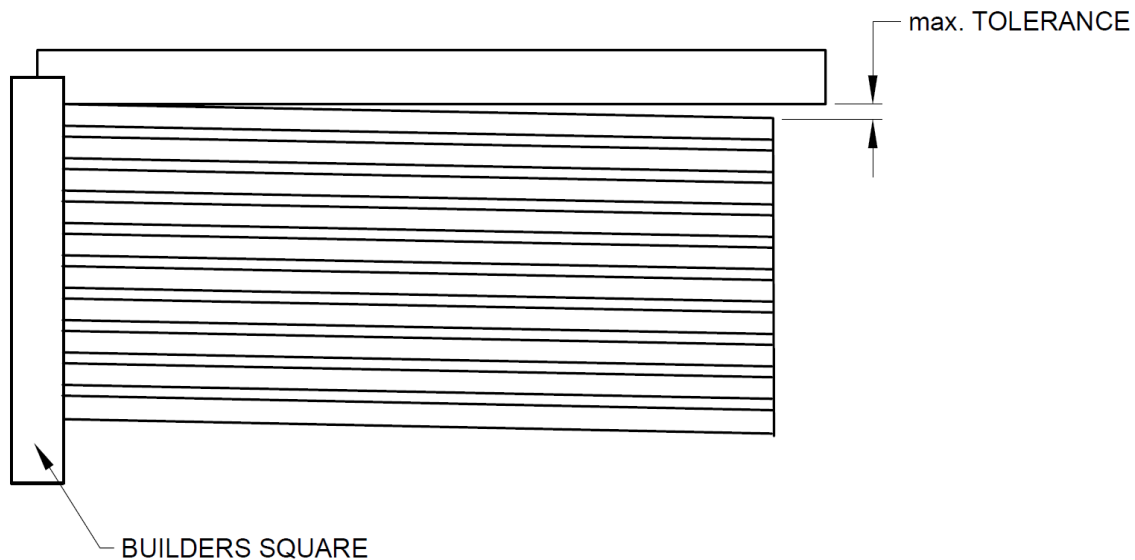


FIG.3 TEST FOR CONCAVITY AND EDGES

6 BULK DENSITY

6.1 The mean bulk densities of the files when tested as per method given in **6.1.1** shall not exceed 1 200 kg/m³ and shall be not below 900 kg/m³.

6.1.1 The test specimen shall be dried at 110°C to constant mass; such that two consecutive mass taken at an interval of 2 h shall not vary by 0.05 percent and shall be; when cooled and weighed. The bulk volume of the tile is determined measuring the external dimensions without counting the grooves. Bulk density (D) shall be calculated by the formula, $D = w/v$, where w is the mass of the dry sample and v is the bulk volume. The result shall be expressed in kg/m³ to an accuracy of 10 units.

7 BREAKING STRENGTH

The breaking load of the tile determined in accordance procedure laid down in Annex A shall not be less than 10 N/mm length.

8 WATER ABSORPTION

The water absorption of the tile by mass, when tested in accordance with the procedure laid down in Annex B shall be not more than 15 percent. The individual values shall be not more than 17.2 percent.

NOTE — An alternate value of 10 percent maximum water content may also be agreed upon, if specified by the purchaser.

9 SAMPLING

9.1 For checking requirements specified in 4 and 7 at least 25 tiles shall be selected at random for every 2 500 tiles or fraction thereof in a lot, by the purchaser (or representative). Additional specimens may be taken for tests at discretion of the purchaser. The number of tiles taken from a lot tests shall be not less than 25 in any one lot.

9.2 The permissible number of defectives for visual and dimensional characteristics shall be as per Table 1 of IS 5454.

10 MARKING

10.1 Each tile shall be clearly and indelibly marked with the following:

- Identification of the source of manufacture,
- A mark 'Filler' or 'F' to indicate filler tile, and
- Batch/Control unit number.

10.2 BIS Certification Marking

10.2.1 Each tile may also be marked with the Standard Mark.

10.2.2 The hollow clay tiles conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the rules and regulations framed thereunder, and the hollow clay tiles may be marked with the Standard Mark.

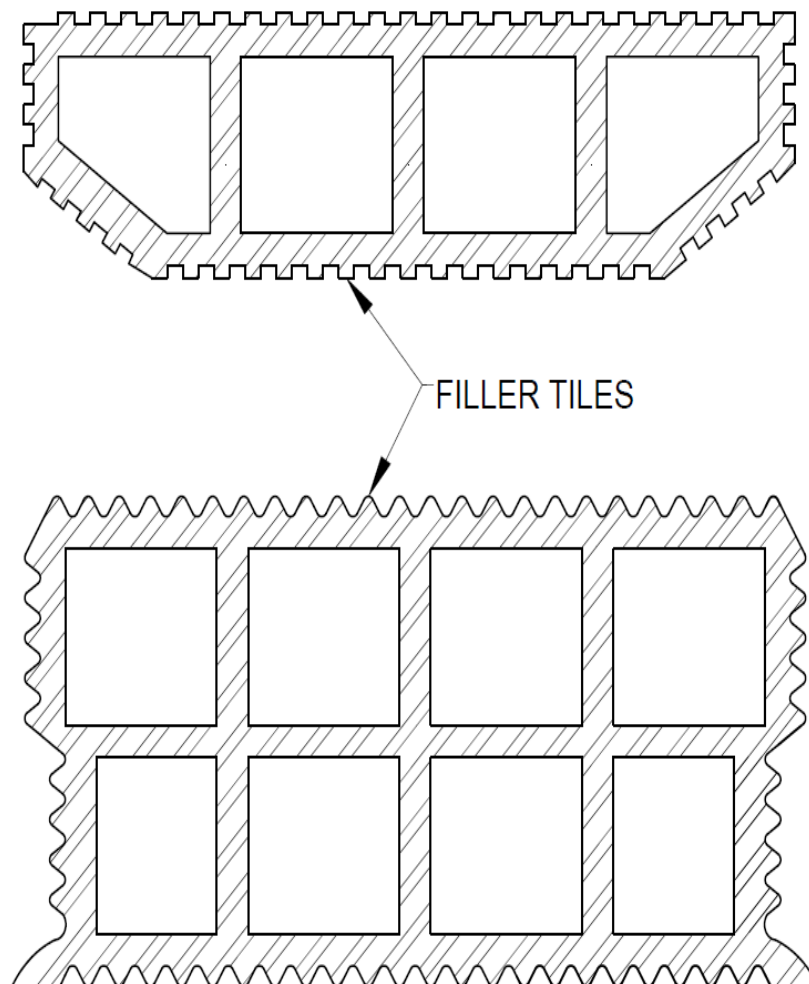


FIG.4 TYPICAL SHAPE OF HOLLOW CLAY FILLER TILES

ANNEX A
(Clause 7)

BREAKING STRENGTH TEST

A-1 TEST SPECIMEN

At least six tiles shall be selected at random for this test from the samples selected in the manner described in 9.

A-2 PROCEDURE

A-2.1 Prior to testing, the tiles shall be immersed in water for 24 h and the surplus moisture may be removed with a damp cloth.

A-2.2 The tiles shall be suitably and simply supported without any mortar at the supports. The supports shall be in the centre of extreme shell walls. An axial loading at a uniform rate of 7 ± 1 N/mm length per minute and shall be applied through a steel plate 20 mm wide and kept centrally over the entire length of the tile and parallel to the supports.

A-2.3 The tile shall be loaded till failure and the load at failure shall be noted and reported accurate to 0.1 digit.

ANNEX B
(Clause 7.1)

WATER ABSORPTION TEST

B-1 TEST SPECIMEN

At least six tiles shall be selected at random for this test from the samples selected in the manner described in 9.

B-2 APPARATUS

The apparatus shall consist of a balance sensitive to within 0.1 percent of the mass of the specimen.

B-3 PROCEDURE

The test specimen shall be dried to constant mass such that two consecutive mass taken at an interval of 2 h shall not vary by 0.05 percent in a ventilated oven at 110° to 115°C. If the specimen is known to be relatively dry this may be accomplished within 24 h, if wet, drying may be prolonged till constant mass is attained. The specimen shall then be cooled approximately to room temperature and weighed (W_1). The cool specimen shall be completely immersed in clean water 27 ± 2 °C for 24 h. Each specimen shall be removed/drained, the surface water wiped off

with a damp cloth and weighed (W_2). Weighing of each specimen shall be completed within 3 min after removal from water.

B-4 CALCULATION

The percentage of water absorption by mass shall be calculated as given below:

$$\text{Water absorption, percent by mass} = \frac{W_2 - W_1}{W_1} \times 100$$

where

W_2 = Mass of specimen after soaking in water, in g; and

W_1 = Mass of the dry specimen, in g.

B-5 RESULT

The water absorption percent of the lot shall be calculated as the average value of the water absorption percent of specimens. The individual as well as the average shall be reported to the nearest one decimal place.

ANNEX C
(Foreword)

COMMITTEE COMPOSITION

Clay and Stabilized Soil Products for Construction Sectional committee, CED 30

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Indian Institute of Science, Bengaluru	DR B. V. VENKATARAMA REDDY (<i>Chairperson</i>)
Auroville Earth Institute, Villupuram	SHRI SATPREM MAINI
Building Materials & Technology Promotion Council, New Delhi	SHRI SHARAD GUPTA SHRI D. P. SINGH (<i>Alternate</i>)
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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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